

## PATENT SPECIFICATION (11) 1 520 470

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- (21) Application No. 44972/75 (22) Filed 30 Oct. 1975 (19)  
 (31) Convention Application No. 2 461 428  
 (32) Filed 24 Dec. 1974 in  
 (33) Fed. Rep. of Germany (DE)  
 (44) Complete Specification published 9 Aug. 1978  
 (51) INT. CL.\* E04C 2/40  
 (52) Index at acceptance

F2M 227 233 244 274 C2  
 E1B 1A3B 1C2D 1C2F 1CX 1G2A



(54) IMPROVEMENTS IN OR RELATING TO JOINT CONSTRUCTIONS  
 AND TO CONSTRUCTION ELEMENTS

- (71) We, HOESCH WERKE AKTIEN-  
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 strasse 12, Germany, a German Company,  
 do hereby declare the invention, for which  
 5 we pray that a patent may be granted to us,  
 and the method by which it is to be per-  
 formed, to be particularly described in and  
 by the following statement:—
- 10 The invention relates to joint construc-  
 tions and to construction elements, wherein,  
 for effecting connection between adjacent  
 elements a first element has a groove formed  
 15 along an edge thereof and a second element  
 has a tongue formed along an edge thereof  
 for cooperation with the groove, a sealing  
 strip being arranged between the groove and  
 the tongue.
- 20 In a known type of joint using such tongue  
 and groove connections, the sealing strip is  
 arranged in the base of the groove and seal-  
 ing is effected by pushing the one element in  
 its plane against the previously fixed adja-  
 25 cent element, whereby the end edge of the  
 tongue is forced against the sealing strip.  
 In most cases auxiliary devices are necessary  
 for effecting this operation. Furthermore, if  
 there are small irregularities in the forma-  
 30 tion of the groove or the sealing strip ar-  
 rangement, or if there are irregularities in the  
 compression force applied, these may give  
 rise to irregularities in the sealing effect and  
 a variation of the gap width, which in the  
 35 case of many construction elements can  
 constitute an unfavourable appearance.
- The present invention has as its basic  
 object the provision of an improved joint  
 construction having such tongue and groove  
 40 connections, which provides an excellent  
 quality of seal by use of simple construction  
 and which is ensured over a long period of  
 time, which can be accurately assembled  
 without the use of any special auxiliary  
 45 means, and which achieves a better per-  
 formance, in particular greater safety in the  
 event of fire.
- In accordance with the invention there is  
 provided a joint construction comprising a  
 first element having a groove formed along  
 an edge thereof and a second element having  
 50 a tongue formed along an edge thereof for  
 cooperation with said groove, the root of the  
 tongue being narrower than its tip and the  
 tongue having a sealing strip secured to one  
 55 side face thereof for contact with one side  
 wall of the groove, the overall width of the  
 tongue and sealing strip being greater than  
 the width of the groove and said tongue-form-  
 ing and said groove-forming edges having  
 60 shapes such as to allow the second element  
 to pivot about a zone of contact of the  
 tongue-forming and groove-forming edges  
 remote from the sealing element from an  
 initial position in which the tongue is located  
 65 in the groove with the elements in an inclined  
 position with respect to each other to a final  
 position in which the elements are generally  
 aligned with respect to each other and the  
 sealing strip is compressed against said one  
 70 groove side wall.
- Preferably, in said initial position the seal-  
 ing strip is out of contact with said one  
 groove side wall, and preferably also, in said  
 final position, a portion of the other side face  
 75 of the tongue is pushed against the other side  
 wall of the groove.
- Preferably, said zone of contact includes,  
 on the first element, a portion of said groove-  
 forming edge which is contiguous with the  
 other side wall of the groove and, on the  
 80 second element, portions of the other face of  
 the tongue and of the tongue forming edge  
 adjacent thereto, and preferably also, the  
 other side face of the tongue is inclined with  
 respect to the second element and said one  
 85 face of the tongue, whereby the root of the  
 tongue is narrower than its tip.
- In accordance with a preferred feature of  
 the invention, said groove-forming edge adja-  
 cent said one groove wall extends away from  
 90 said first element and forms a bearing ele-  
 ment for receiving means for securing said  
 element to a substructure.
- The invention also provides a construction  
 element having oppositely disposed edges,  
 95 a first such edge having a groove formed  
 therein and a second such edge having a  
 tongue formed therein, the root of the tongue

being narrower than its tip and the tongue having a sealing strip secured to one side face thereof and the overall width of the tongue and sealing strip being greater than the width of the groove, said tongue and said groove being shaped so as to be co-operable respectively with a groove and a tongue formed in edges of further such building elements to form a joint construction as defined in any of the preceding paragraphs.

By the proposed solution of the problem the result is achieved that the assembly of the joint is effected by presenting the second element in a plane oblique to the plane of the first element with the edges in contact along the zone of contact so that the tongue is accurately and positively guided as the second element is swung into position in the plane of the first element.

Also the comparatively advantageous lever arm ratio of the joint element width to the width of the tongue, as well as the wedging action which is brought into play, achieve a very high compression between the leading edge of the tongue and the groove, and between the sealing strip and the groove, whilst the leading edge of the tongue, being under the pressure, assumes advantageously the function of a seal.

As a result of the positive cooperation between the groove-forming and the tongue-forming edges and because no force is applied in the plane of the walls of the groove, a uniform gap between the two adjacent joint elements is ensured.

The comparatively strong cross section of the edges of the outer cladding affords a large degree of stiffness opposing outward bending, whilst the inner cladding can support itself against the substructure. In this way great safety is afforded against a bursting open of the tongue and groove joint, for example even in the case of fire, which bursting open can otherwise occur under conditions of excessive bending or bulging. The stability of the joint is still further increased by reason of the fact that the inherent high stiffness of the edges of the tongue and the groove is enhanced in a preferred embodiment in which these parts are held in position relative to each other by a screw connection onto the substructure, which advantageously is not visible from outside.

The invention will be readily understood from the following illustrative description and the accompanying drawings, in which:

Fig. 1 is a schematic sectional plan view of a joint construction between two joint or construction elements in accordance with the invention, the starting position of one of the elements before making the joint being shown in chain dotted line; and

Fig. 2 is a fragmentary like view of one of the joint elements modified by the presence

of a continuous insert of synthetic plastics material.

Fig. 1 shows a first joint element 1 provided with a groove and a second joint element 2 provided with a tongue. The joint elements of the invention may comprise edging means for a panel, having then either a tongue or a groove, or complete panels having a tongue at one edge and a groove at another edge usually parallel to the first.

The illustrated joint elements consist of outer claddings 10 and 20 respectively, inner claddings 11 and 21 respectively and a core layer 3 which may be of hard synthetic foam material or plastics resin foam. The method of reference numbering is adopted so that 10 and 20 indicate the cladding at the same outer side of the elements, these references being retained as prefixes in the subsidiary numbering when indicating the parts of the outer cladding around the edge of the groove and the outer cladding round the edge of the tongue respectively. The same applies for the referencing of the inner cladding 11 and 21 respectively. The outer cladding 10 at the groove side 1 forms a contact edge 101, which is followed by a groove 102, which comprises the outer wall of the groove 1021, the base of the groove 1022 having the width 10221, and the inner groove wall 1023, which terminates in the stepped surface 1024 of a bearing element for receiving means for securing the joint element to a substructure.

The inner cladding 11 at the groove side 1 of the joint is substantially planar and is upset at its end 111.

A screw 12 penetrates the surface 1024 of the bearing element, the core layer 3 and the inner cladding 11. In the practical example according to Fig. 2 a continuous synthetic plastics insert 13 in the bearing element is penetrated instead of the core layer 3 of Fig. 1.

In the joint element at the tongue side 2 the outer cladding 20 forms a guide surface 201 consisting of the vertical ledge 2011 and the inclined surface 2012, this cladding further extending over the leading edge 20121 into the end face 202 of the tongue, and therefrom extending to the bent portion 203 and up to the sealing strip 22 inserted into the core layer 3.

The inner cladding 21 forms a rebate 211, whose extended edge 212 is taken up to the other side of the sealing strip 22.

The tongue 23 is therefore bounded by the inclined surface 2012, the tongue end face 202, the bent portion 203 and the sealing strip 22.

The manner of assembling the individual joint elements appears from Fig. 1, from which it is immediately evident that the joint element which is to be displaced out of the position indicated in the dashed and dotted lines can be brought into its final position

relative to the already positioned and secured adjacent joint element merely by swinging the first element in the direction of the arrow 4 into the plane 5 of the wall of the groove and of the first element.

As a result of this movement there is produced a high but uniform pressure over the whole length of the tongue and groove joint, which pressure is applied between the opposite walls of the rigid groove 102 and, respectively, the leading edge 20121 and the sealing strip 22 of the tongue 23. Because no force is exerted in the direction of the plane of the wall of the groove there will always result a substantially uniform gap 6 between the vertical ledge 2011 of the tongue and the contact edge 101 of the groove, this, and also the non-visible screw connection to the substructure, producing a favourable appearance. On the other hand, however, in particular cases the joints according to the invention may allow a certain amount of displacement of the individual joint elements with respect to each other in the direction of the plane 5 of the wall of the groove, without any excess pressure placing the seal of the joint at risk.

The production of the joint element in accordance with the invention may be carried out by placing the outer claddings 10 and 20 respectively with their plane surfaces downward and then spraying synthetic plastics resin foam 3, in a still liquid condition, into the trough thus formed, which material is thereupon foamed to connect the outer claddings 10 and 20 respectively with the inner claddings 11 and 21 respectively which are applied from above.

#### WHAT WE CLAIM IS:—

1. A joint construction comprising a first element having a groove formed along an edge thereof and a second element having a tongue formed along an edge thereof for co-operation with said groove, the root of the tongue being narrower than its tip and the tongue having a sealing strip secured to one side face thereof for contact with one side wall of the groove, the overall width of the tongue and sealing strip being greater than the width of the groove and said tongue-forming and said groove-forming edges having shapes such as to allow the second element to pivot about a zone of contact of the tongue-forming and groove-forming edges remote from the sealing element from an initial position in which the tongue is located in the groove with the elements in an inclined position with respect to each other to a final position in which the elements are generally aligned with respect to each other and the sealing strip is compressed against said one groove side wall.

2. A joint construction according to claim 1, in which in said initial position the

sealing strip is out of contact with said one groove side wall.

3. A joint construction according to claim 1 or claim 2, in which, in said final position, a portion of the other side face of the tongue is pushed against the other side wall of the groove.

4. A joint construction according to any preceding claim, in which said zone of contact includes, on the first element a portion of said groove-forming edge which is contiguous with the other side wall of the groove and, on the second element, portions of the other face of the tongue and of the tongue-forming edge adjacent thereto.

5. A joint construction according to any preceding claim in which the other side face of the tongue is inclined with respect to the second element and said one face of the tongue, whereby the root of the tongue is narrower than its tip.

6. A joint construction according to any preceding claim, in which said groove-forming edge adjacent said one groove wall extends away from said first element and forms a bearing element for receiving means for securing said element to a substructure.

7. A construction element having oppositely disposed edges, a first such edge having a groove formed therein and a second such edge having a tongue formed therein, the root of the tongue being narrower than its tip and the tongue having a sealing strip secured to one side face thereof and the overall width of the tongue and sealing strip being greater than the width of the groove, said tongue and said groove being shaped so as to be cooperable respectively with a groove and a tongue formed in edges of further such building elements to form a joint construction as claimed in any one of claims 1 to 6.

8. A construction element as claimed in claim 7 which comprises two cladding layers over a core of synthetic plastics hard foam and said groove-forming and tongue-forming edges are formed in the material of the cladding layers.

9. A joint construction or a construction element substantially as hereinbefore described with reference to Figure 1, or to Figure 1 as modified by Figure 2, of the accompanying drawings.

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